



General

Guideline Title

Nutrition and physical activity guidelines for cancer survivors.

Bibliographic Source(s)

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Guideline Status

This is the current release of the guideline.

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Recommendations

Major Recommendations

Nutrition and Physical Activity across the Continuum of Cancer Survivorship

The continuum of cancer survivorship includes treatment and recovery; long-term disease-free living or living with stable disease; and, for some, living with advanced cancer. Survivors in each of these phases have different needs and challenges with respect to nutrition and physical activity.

Nutrition during Cancer Treatment and Recovery

Consuming enough calories to prevent additional weight loss is vital for survivors at risk of unintentional weight loss, such as those who are already malnourished or those who receive anticancer treatments affecting the gastrointestinal tract.

Nutritional assessment for survivors should begin as soon after diagnosis as possible and should take into consideration treatment goals (curative, control, or palliation) while focusing on both the current nutritional status and anticipated nutrition-related symptoms.

During active cancer treatment, the overall goals of nutritional care for survivors should be to prevent or resolve nutrient deficiencies, achieve or maintain a healthy weight, preserve lean body mass, minimize nutrition-related side effects, and maximize quality of life. Suggestions for finding an oncology nutrition expert to provide dietary counseling are provided in the Table below.

Table. Suggestions for Locating Specialized Nutrition Counseling

- Survivors should ask their health care provider for a referral to see an RD, preferably an RD who is also a CSO, if they experience nutrition-related challenges.
- If an oncology dietitian is not available in the medical or surgical practice or medical center where they receive their cancer treatment and care, an appointment with a dietitian associated with their primary care provider clinic may be arranged.

Survivors, caregivers, and providers can also consult the Academy of Nutrition and Dietetics to identify a private practice dietitian in their area.

RD indicates registered dietitian; CSO, certified specialist in oncology.

Providing individualized nutritional advice can improve dietary intake and potentially decrease some of the toxicities associated with cancer treatments. Examples of situations that may benefit from seeking individualized advice include the following:

- For survivors experiencing anorexia or early satiety, and who are at risk of becoming underweight, consuming smaller, more frequent meals with minimal liquids consumed during meals can help to increase food intake. Liquids can and should be consumed in between meals to avoid dehydration.
- For survivors who cannot meet their nutritional needs through foods alone, fortified, commercially prepared or homemade nutrient-dense beverages or foods can improve the intake of energy and nutrients.
- For survivors who are unable to meet their nutritional needs through these measures and who are at risk of becoming malnourished, other means of nutritional support may be needed, such as pharmacotherapy using appetite stimulants, enteral nutrition via tube feeding, or intravenous parenteral nutrition.

The use of vitamins, minerals, and other dietary supplements during cancer treatment remains controversial. With compelling evidence against the use of select supplements in certain oncology populations, health care professionals and survivors need to proceed with caution. If interested in supplementation, individuals should first assess whether they are nutrient deficient, avoid ingesting supplements that exceed more than 100% of the Daily Value, and consider limiting dietary supplement use to therapeutic interventions for chronic conditions such as osteoporosis and macular degeneration, for which scientific evidence supports the likelihood of benefits and low risk of harm.

Exercise during Cancer Treatment

Existing evidence strongly suggests that exercise is not only safe and feasible during cancer treatment, but that it can also improve physical functioning, fatigue, and multiple aspects of quality of life.

The decision regarding when to initiate and how to maintain physical activity should be individualized to the patient's condition and personal preferences. Exercise during cancer treatment improves multiple posttreatment adverse effects on bone health, muscle strength, and other quality-of-life measures. Persons receiving chemotherapy and/or radiation therapy who are already on an exercise program may need to exercise at a lower intensity and/or for a shorter duration during their treatment, but the principal goal should be to maintain activity as much as possible. Some clinicians advise certain survivors to wait to determine their extent of side effects with chemotherapy before beginning an exercise program. For those who were sedentary before diagnosis, low-intensity activities such as stretching and brief, slow walks should be adopted and slowly advanced.

For older individuals and those with bone metastases or osteoporosis, or significant impairments such as arthritis or peripheral neuropathy, careful attention should be given to balance and safety to reduce the risk of falls and injuries. The presence of a caregiver or exercise professional during exercise sessions can be helpful. If the disease or treatment necessitates periods of bed rest, then reduced fitness and strength, as well as loss of lean body mass, can be expected. Physical therapy during bed rest is therefore advisable to maintain strength and range of motion and can help to counteract fatigue and depression.

Recovery Immediately after Treatment

After cancer therapy has been completed, the next phase of cancer survivorship is recovery. In this phase, many symptoms and side effects of treatment that have affected nutritional and physical well-being begin to resolve. Survivors may require ongoing nutritional assessment and guidance in this phase of survival. For those who emerge from treatment underweight or with compromised nutritional status, continued supportive care, including nutritional counseling and pharmacotherapy to relieve symptoms and stimulate appetite, is helpful in the recovery process. After treatment, a program of regular physical activity is essential to aid in the process of recovery and improve fitness.

Long-Term Disease-Free Living or Stable Disease

During this phase, setting and achieving lifelong goals for an appropriate weight, a physically active lifestyle, and a healthy diet are important to promote overall health, quality of life, and longevity. While cancer survivorship is a relatively new area of study and much needs to be learned

regarding the optimal diet and physical activity practices for cancer survivors, current evidence supports recommendations in three basic areas: weight management, physical activity, and dietary patterns. These guidelines are featured in the table below.

Table. American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Survivors

<p>Achieve and maintain a healthy weight.</p> <ul style="list-style-type: none">• If overweight or obese, limit consumption of high-calorie foods and beverages and increase physical activity to promote weight loss. <p>Engage in regular physical activity.</p> <ul style="list-style-type: none">• Avoid inactivity and return to normal daily activities as soon as possible following diagnosis.• Aim to exercise at least 150 minutes per week.• Include strength training exercises at least 2 days per week. <p>Achieve a dietary pattern that is high in vegetables, fruits, and whole grains.</p> <ul style="list-style-type: none">• Follow the American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention.
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Because individuals who have been diagnosed with cancer are at a significantly higher risk of developing second primary cancers, and may also be at an increased risk of chronic diseases such as cardiovascular disease, diabetes, and osteoporosis, the guidelines established to prevent those diseases are especially important for cancer survivors. Because family members of cancer survivors may also be at a higher risk of developing cancer, they should also be encouraged to follow the American Cancer Society (ACS) nutrition and physical activity guidelines for cancer prevention.

Achieving and maintaining a healthy weight, as well as consuming a nutrient-rich diet and maintaining a physically active lifestyle, are important to improve long-term health and well-being.

Exercise has been shown to improve cardiovascular fitness, muscle strength, body composition, fatigue, anxiety, depression, self-esteem, happiness, and several components of quality of life (physical, functional, and emotional) in cancer survivors. In addition, exercise studies have targeted certain symptoms particular to specific cancers and the adverse effects of specific therapies (e.g., lymphedema in survivors of breast cancer) and shown beneficial effects that are more cancer-specific.

At least 20 prospective observational studies have shown that physically active cancer survivors have a lower risk of cancer recurrences and improved survival compared with those who are inactive, although studies remain limited to breast, colorectal, prostate, and ovarian cancer, and randomized clinical trials are still needed to better define the impact of exercise on such outcomes.

Living with Advanced Cancer

For individuals living with advanced cancer, a healthy diet and some physical activity may be important factors in establishing and maintaining a sense of well-being and enhancing their quality of life. Although advanced cancer is sometimes accompanied by substantial weight loss, it is not inevitable that individuals with cancer lose weight or experience malnutrition. Many patients with advanced cancer need to adapt their food choices and meal patterns to meet nutritional needs and to manage cancer symptoms or treatment side effects such as fatigue, bowel changes, and a diminished sense of taste or appetite. For persons experiencing anorexia, negative changes in weight, or difficulty in gaining weight, convincing evidence exists that some medications (e.g., megestrol acetate) can help to enhance appetite.

Additional nutritional supplementation such as nutrient-dense beverages and foods can be consumed by those who cannot eat or drink enough to maintain sufficient energy intake. The use of enteral nutrition and parenteral nutrition support should be individualized with recognition of overall treatment goals (control or palliation) and the associated risks of medical complications and/or ethical dilemmas. Both the American Society for Parenteral and Enteral Nutrition and the Academy of Nutrition and Dietetics position papers recommend that nutrition support be used selectively and with clear purpose.

The evidence of a benefit from exercise for survivors of advanced cancer is insufficient to make general recommendations. Recommendations for nutrition and physical activity in those who are living with advanced cancer are best based on individual nutrition needs and physical abilities.

Selected Issues in Nutrition and Physical Activity for Cancer Survivors

Body Weight

Increasing evidence indicates that being overweight increases the risk of recurrence and reduces the likelihood of disease-free and overall survival

among those diagnosed with cancer. Such data suggest that the avoidance of weight gain and weight maintenance throughout treatment may be important for survivors who are normal weight, overweight, or obese at the time of diagnosis, and that intentional weight loss following treatment recovery among those who are overweight and obese may be associated with health-related benefits.

It is hypothesized that improvements in cancer-related outcomes are possible, and likely probable, through intentional weight reduction. Evidence exists that weight loss that results from intentional exercise and caloric restriction can improve the hormonal milieu and quality of life and physical functioning among survivors who are obese or overweight. It may be difficult for individuals to pursue a host of new dietary, exercise, and behavioral strategies to reduce body weight through reduced energy intake and increased energy expenditure while at the same time balancing the demands of daily life during initial treatments. Thus, for many, active efforts toward intentional weight loss may be postponed until surgery, chemotherapy, and/or radiation treatment is complete.

However, for cancer survivors who are overweight or obese and who choose to pursue weight loss, there appears to be no contraindication to modest weight loss (i.e., a maximum of 2 pounds per week) during treatment, as long as the treating oncologists approve, weight loss is monitored closely, and it does not interfere with treatment. Safe weight loss should be achieved through a nutritious diet that is reduced in energy density and increased physical activity tailored to the specific needs of the patient.

After cancer treatment, weight gain or loss should be managed with a combination of dietary, physical activity, and behavioral strategies. For some who need to gain weight, this means increasing energy intake to exceed energy expended and for others who need to lose weight, reducing caloric intake and increasing energy expenditure via increased physical activity to exceed energy intake. Reducing the energy density of the diet by emphasizing low-energy dense foods (e.g., water- and fiber-rich vegetables and fruits) and limiting the intake of foods and beverages high in fat and added sugar promotes healthy weight control. Limiting portion sizes of energy-dense foods is an important accompanying strategy. Increased physical activity is also an important element to prevent weight gain, retain or regain muscle mass, promote weight loss, and promote the maintenance of weight loss in patients who are overweight or obese.

For survivors who are severely obese and have more pressing health issues, more structured weight loss programs or pharmacologic or surgical means may be indicated. It should be noted that among those who need to lose weight, even if ideal weight is not achieved, it is likely that any weight loss achieved by physical activity and healthful eating is beneficial, with weight losses of 5% to 10% still likely to have significant health benefits. Although most evidence related to these weight management strategies does not come from studies of cancer survivors per se, it is likely that these approaches can apply in the special circumstances of the cancer survivor.

Throughout the cancer continuum, therefore, individuals should strive to achieve and maintain a healthy weight, as defined by a body mass index (BMI) (see Table 3 in the original guideline document) between 18.5 kg/m² and 25 kg/m². Some cancer survivors can be malnourished and underweight at diagnosis or as a result of aggressive cancer treatments. For these individuals, further weight loss can impair their quality of life, interfere with the completion of treatment, delay healing, and increase the risk of complications. In survivors with these difficulties, dietary intake and factors affecting energy expenditure should be carefully assessed.

For those at risk of unintentional weight loss, multifaceted interventions should focus on increasing food intake to achieve a positive energy balance and therefore increase weight. Physical activity may be useful to the underweight survivor when tailored to provide stress reduction and to increase strength and lean body mass, but exceptionally high levels of physical activity make weight gain more difficult.

Physical Activity in Cancer Survivors

Despite the many benefits of exercise for cancer survivors, particular issues may affect the ability of survivors to exercise. Effects of treatment may also increase the risk of exercise-related injuries and adverse effects, and therefore specific precautions may be advisable, including:

- Survivors with severe anemia should delay exercise, other than activities of daily living, until the anemia is improved.
- Survivors with compromised immune function should avoid public gyms and public pools until their white blood cell counts return to safe levels. Survivors who have completed a bone marrow transplant are usually advised to avoid such exposures for one year after transplantation.
- Survivors experiencing severe fatigue from their therapy may not feel up to an exercise program, and therefore they may be encouraged to do 10 minutes of light exercises daily.
- Survivors undergoing radiation should avoid chlorine exposure to irradiated skin (e.g., from swimming pools).
- Survivors with indwelling catheters or feeding tubes should be cautious or avoid pool, lake, or ocean water or other microbial exposures that may result in infections, as well as resistance training of muscles in the area of the catheter to avoid dislodgment.
- Survivors with multiple or uncontrolled comorbidities need to consider modifications to their exercise program in consultation with their physicians.
- Survivors with significant peripheral neuropathies or ataxia may have a reduced ability to use the affected limbs because of weakness or loss

of balance. They may do better with a stationary reclining bicycle, for example, than walking on a treadmill.

After consideration of these and other specific precautions, it is recommended that cancer survivors follow the survivor-specific guidelines written by an expert panel convened by the American College of Sports Medicine (ACSM). The ACSM panel recommended that individuals avoid inactivity and return to normal activity as soon as possible after diagnosis or treatment. For aerobic physical activity, the ACSM panel recommended that survivors follow the *U.S. Department of Health and Human Services 2008 Physical Activity Guidelines for Americans*. According to those guidelines, adults aged 18 to 64 years should engage in at least 150 minutes per week of moderate intensity or 75 minutes per week of vigorous intensity aerobic physical activity, or an equivalent combination of moderate and vigorous intensity aerobic physical activity (see the Table below). Some activity is better than none and exceeding the guidelines is likely to provide additional health benefits. Activity should be done in episodes of at least 10 minutes per session and preferably spread throughout the week. Furthermore, adults should do muscle-strengthening activities involving all major muscle groups at least two days per week. Adults aged older than 65 years should also follow these recommendations if possible, but if chronic conditions limit activity, older adults should be as physically active as their abilities allow and avoid long periods of physical inactivity. Cancer type-specific recommendations will be discussed in the individual cancer sections below.

Table. Examples of Moderate and Vigorous Activities

Moderate Activities (I Can Talk While I Do Them, But I Can't Sing)	Vigorous Activity (I Can Only Say a Few Words without Stopping To Catch My Breath)
<ul style="list-style-type: none">• Ballroom and line dancing• Biking on level ground or with few hills• Canoeing• General gardening (raking, trimming shrubs)• Sports where you catch and throw (baseball, softball, volleyball)• Tennis (doubles)• Using your manual wheelchair• Using hand cyclers (also called ergometers)• Walking briskly• Water aerobics	<ul style="list-style-type: none">• Aerobic dance• Biking faster than 10 miles per hour• Fast dancing• Heavy gardening (digging, hoeing)• Hiking uphill• Jumping rope• Martial arts (such as karate)• Race walking, jogging, or running• Sports with a lot of running (basketball, hockey, soccer)• Swimming fast or swimming laps• Tennis (singles)

Supporting Exercise Behavior Change

Unless behavioral support interventions are provided, the majority of cancer survivors will not benefit fully from regular physical activity. Behavioral support interventions to assist cancer survivors in adopting and maintaining a physically active lifestyle have been reviewed elsewhere. Some successful strategies include short-term supervised exercise (e.g., 12 weeks), support groups, telephone counseling, motivational interviewing, and cancer survivor-specific print materials. The key point for cancer care professionals is that cancer survivors have unique motives, barriers, and preferences for physical activity.

Diet Composition

Protein, carbohydrate, and fat all contribute energy to the diet, and each of these dietary constituents is available from a wide variety of foods. Because many cancer survivors are at high risk of other chronic diseases, such as heart disease, the recommended amounts and types of fat, protein, and carbohydrate to reduce cardiovascular disease risk are also appropriate for cancer survivors, particularly if they are at or above their recommended body weight.

The Institute of Medicine and current Federal Guidelines, as well as the American Heart Association (AHA), recommend a spectrum of dietary composition for the adult population: fat: 20% to 35% of energy (AHA: 25%-35%), carbohydrate: 45% to 65% of energy (AHA: 50%-60%); and protein: 10% to 35% of energy (at least 0.8 g/kg).

A few observational follow-up studies of diet and survival after the diagnosis of prostate cancer have also been reported. In one of these studies, a higher saturated fat intake predicted shorter disease-specific survival and in another, greater monounsaturated fat intake predicted longer survival. Given that men with prostate cancer are at a significant risk of death due to cardiovascular disease, these heart-healthy recommendations appear prudent not only for cancer prevention but also for competing causes of death.

Including foods that are rich in omega-3 fatty acids (e.g., fish, walnuts) in the diet of cancer survivors should be encouraged, because this is associated with a lower risk of cardiovascular diseases and a lower overall mortality rate.

Adequate protein intake is essential during all stages of cancer treatment, recovery, long-term survival, and living with advanced disease. The best

choices to meet protein needs are foods that are also low in saturated fat (e.g., fish, lean meat, skinless poultry, eggs, nonfat and low-fat dairy products, nuts, seeds, and legumes).

No direct evidence has helped to determine whether consuming a vegetarian diet has any additional benefit for the prevention of cancer recurrence over an omnivorous diet high in vegetables, fruits, and whole grains, and low in red meats.

Healthy carbohydrate sources are foods that are rich in essential nutrients, phytochemicals, and fiber, such as vegetables, fruits, whole grains, and legumes. These foods should provide the majority of carbohydrate in the diet.

Limiting the consumption of products with added sugar is recommended.

Current public health recommendations for adults are to eat at least 2 to 3 cups of vegetables and 1.5 to 2 cups of fruits each day. Colorful choices such as dark green and orange vegetables are good sources of nutrients and potentially healthful phytochemicals. Fresh, frozen, canned, raw, cooked, or dried vegetables and fruits all contribute nutrients and other biologically active constituents to the diet. Cooking vegetables and fruits, especially with methods such as microwaving or steaming in preference to boiling in large amounts of water, preserves the bioavailability of water-soluble nutrients and can improve the absorption of others. For example, carotenoids are better absorbed from cooked vegetables than from raw vegetables. There is no evidence that organically grown vegetables and fruits are superior in their content of potential cancer-preventive constituents.

Dietary Supplements

The current body of evidence regarding supplement use by cancer survivors suggests that some general guidance should be considered:

- Before supplements are prescribed or taken, all attempts should be made to obtain needed nutrients through dietary sources.
- Supplements should be considered only if a nutrient deficiency is either biochemically (e.g., low plasma vitamin D levels, B12 deficiency) or clinically (e.g., low bone density) demonstrated.
- Supplements should be considered if nutrient intakes fall persistently below two-thirds of the recommended intake levels. Such a determination should be made by a registered dietitian, who is most qualified to assess the nutrient adequacy of the diet, especially in view of emerging data suggesting that higher nutrient intakes, especially through sources other than foods, may be harmful rather than helpful.

Open dialogue between patients and health care providers should occur regarding dietary supplementation to ensure there is no contraindication in relation to the prescribed cancer therapy or for longer term health effects. In turn, health care providers should make an effort not only to provide time to review dietary supplement decisions with patients, but also to stay abreast of recent research in this area, particularly that related to potential drug interactions. It is most prudent to encourage cancer survivors to obtain the potentially beneficial compounds from food.

Alcohol

Substantial observational evidence indicates that alcohol intake has both positive and negative health effects. For this reason, it is important for the health care provider to tailor advice on alcohol consumption to the individual cancer survivor. The cancer type and stage of disease, treatment, treatment-related side effects, risk factors for recurrence or new primary cancers, and comorbid conditions should be considered in making recommendations.

It is reasonable to recommend that alcohol intake should be avoided or limited among survivors with mucositis and among those beginning head and neck radiation therapy or chemotherapeutic regimens that put them at risk for mucositis.

The link between alcohol intake and risk of some primary cancers has been established, including cancers of the mouth, pharynx, larynx, esophagus, liver, and breast and, for some forms of alcohol beverages, colon cancer. In individuals who have already received a diagnosis of cancer, alcohol intake could also increase their risk of new primary cancers of these sites; moreover, a long-standing literature in patients with head and neck cancer suggests that continued alcohol consumption (as well as smoking) leads to lower survival rates, thus supporting the need to limit alcohol consumption in this population.

Food Safety

Food safety is of special concern for cancer survivors, especially during episodes of treatment-related immunosuppression that can occur with certain cancer treatment regimens. Survivors can become susceptible to developing infections due to treatment-induced leukopenia and neutropenia. During any immunosuppressive cancer treatment, survivors should take extra precautions to prevent infection, and they should be particularly careful to avoid eating foods that may contain unsafe levels of pathogenic microorganisms. By following safe food practices, cancer survivors and their caregivers can reduce the risk of foodborne illness. General guidelines for food safety, as shown in the table below, should be followed.

Table. General Guidelines for Food Safety

- Wash hands with soap and water thoroughly before eating.
- Keep all aspects of food preparation clean, including washing hands before food preparation and washing fruits and vegetables thoroughly.
- Use special care in handling raw meats, fish, poultry, and eggs.
- Thoroughly clean all utensils, countertops, cutting boards, and sponges that have contact with raw meat; keep raw meats and ready-to-eat foods separate.
- Cook to proper temperatures; meats, poultry, and seafood should be thoroughly cooked and beverages (milk and juices) should be pasteurized. Use a food thermometer to check internal temperatures of meats before serving.
- Store foods promptly at low temperatures (below 40°F) to minimize bacterial growth.
- When eating in restaurants, avoid foods that may have potential bacterial contamination such as items from salad bars; sushi; or raw or undercooked meat, fish, shellfish, poultry, and eggs.
- Avoid raw honey, milk, and unpasteurized fruit juice, and choose pasteurized versions instead.
- If there is any question or concern about water purity (e.g., well water), it can be checked for bacterial content by contacting your local public health department.

Nutrition and Physical Activity by Selected Cancer Sites

Breast Cancer

For a woman diagnosed with breast cancer, achieving or maintaining a desirable weight may be one of the most important lifestyle pursuits.

Although it must be considered that unexplained weight loss may be a symptom of recurrent disease and should be monitored closely, there is a vast difference between weight loss that is intentional or purposeful versus that which is unexplained or a consequence of disease. Indeed, given accumulating data to suggest that overweight and obesity adversely influence not only cancer-specific outcomes but also overall health and quality of life, weight management is now considered a priority standard of care for overweight women diagnosed with early stage breast cancer.

Research suggests that interventions should be aimed at not only curbing weight gain during treatment but also at preserving or rebuilding muscle mass. Moderate physical activity (especially resistance training) during and after treatment may help survivors maintain lean muscle mass while avoiding excess body fat.

Even with the increased use of sentinel lymph node dissection, lymphedema remains a concern among breast cancer survivors. However, aerobic physical activity and resistance training appear to be both safe and effective in reducing the incidence of lymphedema among survivors at high risk of this condition, and in improving the symptoms and severity of lymphedema for those in whom the condition was preexisting. Progressive resistance training under the supervision of a trained exercise therapist and using appropriate compression garments is recommended. In addition, because obesity is a major risk factor for lymphedema, weight loss is recommended among survivors who are overweight or obese.

For breast cancer survivors, the decision to drink alcoholic beverages at moderate levels is complex because they must consider their levels of risk for recurrent or second primary breast cancer as well as cardiovascular disease.

It is important to remember that nutrition and physical activity recommendations to reduce the risks of a second primary breast cancer and heart disease are especially important for breast cancer survivors. Diets should emphasize vegetables and fruits, have low amounts of saturated fats, and include sufficient dietary fiber. Most importantly, breast cancer survivors should strive to achieve and maintain a healthy weight through eating a well-balanced diet and regular exercise. In addition, regular physical activity should be maintained regardless of any weight concerns.

Colorectal Cancer

Colorectal cancer survivors should be advised to maintain a healthy weight, participate in regular physical activity, and eat a well-balanced diet consistent with guidelines for cancer and heart disease prevention. Colorectal cancer survivors with chronic bowel problems or surgery that affects normal nutrient absorption should be referred to a registered dietitian to modify their diets to accommodate these changes and maintain optimal health.

Endometrial Cancer

No studies have reported on the role of dietary factors and physical activity in the prognosis of endometrial cancer. Although the role of obesity in endometrial cancer prognosis is not completely understood, studies have shown that a higher BMI and a sedentary lifestyle are associated with a poorer quality of life among endometrial cancer survivors.

Ovarian Cancer

While the current evidence is limited and inconclusive, it points to a possible role of dietary factors, physical activity, and body size and weight changes in modulating ovarian cancer survival, and for physical activity in improving the quality of life among ovarian cancer survivors. Further studies are needed before public health recommendations can be made.

Hematologic Cancers and Cancers Treated with Hematopoietic Stem Cell Transplantation

Systematic reviews of adult interventions have reported that physical activity can improve body composition, cardiorespiratory fitness, fatigue, muscle strength, physical functioning, and quality of life.

The conditioning regimen of intensive chemotherapy, often in conjunction with total body irradiation, is associated with several specific side effects that have significant adverse nutritional consequences such as nausea, vomiting, diarrhea, oropharyngeal mucositis, and esophagitis. Total body irradiation damages the gastrointestinal mucosa, resulting in malabsorption and diarrhea because these epithelial cells are highly susceptible to the effects of radiation. Nutritional problems also result from adverse effects of various drug therapies, such as oral immunosuppressive agents and antibiotics that may be necessary for posttransplant management. Finally, the common complication of graft versus host disease (in patients who receive an allogeneic transplant) results in abdominal pain, nausea, severe diarrhea, malabsorption, and substantial nitrogen losses. Patients who do not receive specialized nutritional support typically eat poorly for a prolonged period and are at high risk of poor nutritional status.

As an infection prevention strategy, low-microbial diets are often prescribed for transplant recipients. A low-microbial or low-bacteria diet is primarily a cooked-food diet, because the major limitation imposed is on fresh or uncooked food items. Because many food restrictions are imposed with this strategy, the nutrient adequacy of the actual food intake of patients who are prescribed the low-microbial diet should be monitored. Prevention of malnutrition and correction of energy and nutrient inadequacies has been incorporated into the standardized posttransplant treatment at most transplant centers.

Lung Cancer

During treatment and the immediate recovery period, lung cancer survivors may benefit from eating foods that are energy-dense and easy to swallow. Small, frequent meals may be easier to manage than three large meals per day. Medications and nutritional support via energy-dense nutritional supplements or enteral nutrition may be helpful for those experiencing weight loss. If nutrient deficiencies are present or survivors cannot eat enough to adequately meet micronutrient needs, a multivitamin-mineral supplement is advisable, either in pill or liquid form.

Recommendations for nutrition and physical activity for individuals who are living with lung cancer are best made based on individual needs. Striving toward a healthy weight by adjusting food intake and physical activity is a reasonable goal, as is ensuring that nutritional needs are met with a nutritious diet and a multivitamin-mineral supplement, if needed, to achieve adequate levels of intake.

Prostate Cancer

Although benefits to prostate cancer risk and progression from vegetables and fruits are far from certain, a diet high in these foods has been found to reduce the risk of cardiovascular diseases. Therefore, it is probably beneficial for prostate cancer survivors to eat plenty of micronutrient- and phytochemical-rich vegetables and fruits.

It would seem prudent for men to adopt a diet that provides at least 600 IU of vitamin D per day and to consume adequate, but not excessive, amounts of calcium (i.e., exceeding 1,200 mg/day), as well as to pursue active lifestyles that include routine weight-bearing exercises.

Men in whom prostate cancer has been diagnosed should strive to achieve and maintain a healthy weight, pursue a physically active lifestyle, and consume a diet that is rich in vegetables and fruits and low in saturated fat, with reliance on dietary sources of calcium that are within moderate levels. Such dietary suggestions, however, need to be considered within the context of an increased risk of fractures from antiandrogen therapy and physical activity patterns. Although the evidence relating these recommendations to prostate cancer recurrence is limited, there are likely substantial other benefits, most prominently decreasing cardiovascular disease risk, which is the major cause of death in prostate cancer survivors.

Upper Gastrointestinal and Head and Neck Cancers

Head and neck cancers can directly compromise food intake, and a high percentage of patients have lost weight or are malnourished at the time of diagnosis. Comprehensive care of these survivors includes appropriate nutritional assessment and support, and physical activity and physical therapy to improve overall health before, during, and after treatment. Poor nutrient intake can stem from difficulties in biting, chewing, and swallowing at diagnosis or after surgery and from xerostomia, mucositis, and taste alterations resulting from radiation therapy or concurrent chemoradiation therapy. Many long-term survivors of head and neck cancers will experience at least some degree of aspiration associated with substantial weight loss, diminished swallowing efficiency, and lower quality-of-life scores.

During and immediately after treatment, the texture, temperature, consistency, nutrient content, and frequency of oral feedings often need to be modified. Acidic, salty, or spicy foods and foods at extreme temperatures may not be well tolerated. Sugar-free gums and mints as well as the use of commercial oral rinses and gels and the consumption of water may provide limited relief of symptoms and enhance appetite. Pureed or blenderized foods may be better tolerated during treatment and recovery.

Chemoradiation may have a significant effect on a patient's ability to eat, which should improve by 12 months after treatment. Health care providers may offer alternate approaches to meeting nutrient requirements if eating and drinking by mouth cannot support these needs. Gastrostomy tubes are commonly placed prophylactically to support the patient through treatment and the period of time immediately after treatment.

Patients are encouraged to eat soft, moist foods throughout treatment to maintain their swallowing function. Patients with esophageal and gastric cancers may need support through treatment as well. This population may require placement of either a gastrostomy tube or a jejunostomy tube, depending on anticipated or performed surgical interventions. When tube feeding is started immediately after surgery for esophageal or gastric cancer, it may reduce both the duration of intensive care unit treatment and total hospital stay.

Patients with esophageal or gastric cancer may have symptoms such as early satiety, dumping syndrome, or malabsorption that affect food and nutrient intake, as well as absorption and digestion; the effects of treatment may result in long-term or permanent nutritional complications. Survivors with esophageal cancer can experience temporary or long-term dysphagia, odynophagia, gastroesophageal reflux, and early satiety. Diet modifications determined with the assistance of an oncology-certified registered dietitian can help to manage some treatment-related conditions of esophageal or gastric cancer, help regain or maintain a healthy weight, and restore some quality of life.

The nutritional management of patients with gastric cancer is based on determining the portion of the stomach involved with disease or the condition after surgical resection. If either the esophageal or pyloric sphincter has been affected, diet modifications will involve small, more frequent meals/snacks, no concentrated sweets, and the consumption of fluids between meals due to early satiety. In addition, the patient is advised to stop eating 3 hours before bedtime or going to bed to avoid aspiration.

There is a significant risk of micronutrient deficiencies in this patient population due to the alteration of the digestion process and absorption of minerals such as iron and calcium and vitamins such as vitamin B12. If possible, a patient's status should be tested pretreatment and followed through the treatment and long-term survivorship period.

In the case of pancreatic cancer, there is increasing evidence that supplementation with omega-3 fatty acids has a favorable effect on short-term weight status, performance status, or related factors. Weight loss is common at diagnosis in this population, and these patients often experience profound exocrine dysfunction, in addition to endocrine dysfunction, throughout the course of their cancer treatment. Pancreatic enzymes can be very helpful, along with diet modification, to manage disease symptoms and treatment side effects. Consultation and close follow-up with a registered dietitian for an individualized dietary prescription is recommended.

In the absence of more definitive information, survivors of head and neck and upper gastrointestinal cancers should follow, to the extent they are able, the ACS nutrition and physical activity guidelines for the prevention of cancer.

Common Questions about Diet, Physical Activity, and Cancer Survivorship

Cancer survivors often request information and advice from their healthcare providers about food choices, physical activity, and dietary supplement use to improve their quality of life and survival. Health professionals who counsel patients should emphasize that no one study provides the last word on any subject, and that individual news reports may overemphasize what seem to be contradictory or conflicting results because they seem to be new, different, or challenge conventional wisdom.

The best advice about diet and physical activity is that it is rarely advisable to change diet or activity levels based on a single study or news report. See the original guideline document for questions and answers that address common concerns of cancer survivors regarding diet and physical activity. The following questions are addressed:

- Does alcohol increase the risk of cancer recurrence?
- Should alcohol be avoided during cancer treatment?
- What do antioxidants have to do with cancer?
- Is it safe to take antioxidant supplements during cancer treatment?
- Will eating less total fat, or less of certain types of fat, lower the risk of cancer recurrence or improve survival?
- Can dietary fiber prevent cancer or improve cancer survival?
- Are there special food safety precautions for individuals undergoing cancer treatment?
- Should I avoid meats?

- Does being overweight increase risk of cancer recurrence and second primary cancers?
- Are foods labeled organic recommended for cancer survivors?
- Should I exercise during cancer treatment and recovery?
- Are there special precautions survivors should consider?
- Can regular exercise reduce the risk of cancer recurrence?
- Is yoga beneficial to cancer patients and survivors?
- What are phytochemicals, and do they reduce cancer risk?
- Is including soy-based foods in the diet recommended for cancer survivors?
- Does sugar "feed" cancer?
- Would survivors benefit from using vitamin and mineral supplements?
- Can dietary supplements lower cancer incidence or the risk of recurrence?
- Will eating vegetables and fruits lower the risk of cancer recurrence?
- Is there a difference in the nutritional value of fresh, frozen, and canned vegetables and fruits?
- Does cooking affect the nutritional value of vegetables?
- Should I be juicing my vegetables and fruits?
- Do vegetarian diets reduce risk of cancer recurrence?
- How much water and other fluids should I drink?

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Cancer, including:

- Breast cancer
- Colorectal cancer
- Endometrial cancer
- Ovarian cancer
- Hematological cancer
- Lung cancer
- Prostate cancer
- Upper gastrointestinal cancer
- Head and neck cancer

Guideline Category

Counseling

Management

Prevention

Rehabilitation

Clinical Specialty

Colon and Rectal Surgery

Family Practice

Gastroenterology

Geriatrics

Hematology

Internal Medicine

Nursing

Nutrition

Obstetrics and Gynecology

Oncology

Physical Medicine and Rehabilitation

Preventive Medicine

Pulmonary Medicine

Surgery

Thoracic Surgery

Urology

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Dietitians

Health Care Providers

Health Plans

Hospitals

Managed Care Organizations

Nurses

Patients

Physical Therapists

Physician Assistants

Physicians

Public Health Departments

Guideline Objective(s)

- To present health care providers with the best possible information from which to help cancer survivors and their families make informed choices related to nutrition and physical activity
- To update the 2006 guidelines on nutrition and physical activity for cancer survivors

- To address cancer survivors' concerns about food choices, physical activity, and dietary supplements to improve their treatment outcomes, quality of life, and overall survival

Target Population

Cancer survivors

Note: The trajectory of cancer survivorship is marked by 3 general phases: 1) active treatment and recovery; 2) living after recovery, including survivors who are disease free or who have stable disease; and 3) advanced cancer and end of life.

Interventions and Practices Considered

Counseling regarding nutrition and physical activity-related lifestyle modifications for cancer survivors:

- Maintenance of healthy body weight
- Nutrition and food choices
- Balancing fat, protein and carbohydrate intake
- Increasing consumption of vegetables and fruits
- Moderation of alcohol intake
- Food safety
- Dietary supplements
- Maintaining physical activity
- Issues related to specific cancer sites

Major Outcomes Considered

- Nutritional status
- Survival
- Mortality
- Risk of cancer progression, recurrence, and second cancers
- Risk of and mortality from cardiovascular and other chronic diseases
- Quality of life
- Treatment outcomes
- Health-related fitness outcomes
- Safety of interventions
- Weight loss/gain
- Body mass index

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The literature search dates for this update were 2005 to August 2010. Reviewers were given the following suggested review procedures:

While conducting systematic literature reviews in all the relevant areas seems impractical, these procedures attempt to provide general guidelines to

make the reviews in the different areas somewhat systematic, and standardize methods across cancer sites. Thus, each review should be based on recent literature, systematic reviews and/or meta-analyses since the year 2005 (just prior to the publication of the most recent American Cancer Society [ACS] Guidelines). The goal is to focus on the top papers in each assigned topic area (e.g., "top 10"), rather than an exhaustive review of all literature.

Recommended review procedure for assigned topic(s):

1. Using PubMed, obtain the most recent key scientific literature. Include search terms based on:
 - a. Year (e.g., since 2005)
 - b. Relevant cancer(s)
 - c. Exposures (World Cancer Research Fund [WCRF] has suggested search terms available at www.dietandcancerreport.org).
2. Literature identified can include:
 - a. Reviews conducted by other agencies, for example, the International Agency for Research on Cancer on weight and physical activity (2002), fruits and vegetables (2003), and cruciferous vegetables (2004). For many cancers and exposures, the most recent comprehensive review will likely be the 2007 World Cancer Research Fund/American Institute for Cancer Research monograph (www.dietandcancerreport.org); the comprehensive systematic literature reviews they commissioned are available online); or relevant, comprehensive chapters in text books (e.g., Nutritional Oncology, 2nd Edition, 2006).
 - b. Recent meta-analyses and review papers (since 2005). Focus on review papers that provide a fair representation of the literature, rather than only those that reinforce a single perspective (i.e., look primarily for systematic literature reviews if these are available).
 - c. Individual studies, with the highest emphasis to papers that meet the following criteria:
 - i. Peer-reviewed publication in English since 2005, unless a seminal paper(s) prior to this date still carries most weight
 - ii. Study designs to consider include randomized controlled trials, prospective studies, and well-conducted population-based case-control studies
 - iii. Large study: more than 200 cancer cases analyzed, except for rarer cancers when 100 would be acceptable (e.g., ovary, pancreas, endometrial).
 - iv. High-quality exposure data: validated exposure assessment (e.g., validated food frequency questionnaire [FFQ])
 - v. High-quality assessment of covariates and analytic methods: analyses controlled for important confounders (e.g., energy and other important risk factors for that particular cancer)
 - d. If there are important papers that predate 2005, especially in light of more recent literature, they can be included.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Rating Scheme for the Strength of the Evidence

Not applicable

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Reviewers were asked to consider the following criteria when synthesizing findings:

- a. Strength of association
- b. Consistency across studies, including across study designs. Separate results by study design when presenting the evidence.
- c. Dose-response
- d. Biologic plausibility

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The American Cancer Society (ACS) convened a group of experts in nutrition, physical activity, and cancer to evaluate and synthesize the scientific evidence and best clinical practices related to nutrition and physical activity after the diagnosis of cancer.

Reviewers were asked to compare results from the literature reviews to *2006 ACS Nutrition and Physical Activity Guidelines* or the *Guide to Informed Choices*. They were asked whether new evidence appeared strong enough to warrant changes, and if so what they would recommend. They were asked to consider whether the recommendations were consistent with other Guidelines.

Reviewers were asked to provide a brief document – no more than two pages – that examined what the current *ACS Guidelines* or *Guide to Informed Choices* say about the reviewed topic, suggested modifications (ranging from suggestions for no modification, to dropping any language, to adding completely new sections, to reversing what may have been said previously), and supported these suggestions based on their review of the literature.

Prepared summaries were circulated among Committee members in advance of the August 2011 meeting. Reviewers were asked to be prepared to discuss all summaries. The aim of the meeting was to end with a good consensus of what the 2011 revisions should say, with clear guidance to a writing group.

The writing group then prepared a draft of the next version of the Guidelines and Guide to Informed Choices, which was distributed to Committee members for their comments and editing.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is not specifically stated for each recommendation.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate nutrition and physical activity during and after cancer treatment to improve treatment outcomes, quality of life, and overall survival

Potential Harms

- The use of enteral nutrition and parenteral nutrition support in patients living with advanced cancer should be individualized with recognition of overall treatment goals (control or palliation) and the associated risks of medical complications and/or ethical dilemmas.
- Effects of treatment may increase the risk of exercise-related injuries and adverse effects (see the "Major Recommendations" field for precautions).
- Dietary suggestions for men in whom prostate cancer has been diagnosed need to be considered within the context of an increased risk of fractures from antiandrogen therapy and physical activity patterns.
- While dietary supplements are indicated in cases of nutrient deficiency (either that which is confirmed through laboratory testing or through the clinical presence of disease [e.g., osteoporosis or osteopenia]), given the growing literature on the adverse effects of nutritional intake beyond normal levels, a concern exists that supplements may do more harm than good.

Contraindications

Contraindications

Particular issues for cancer survivors may affect or contraindicate their ability to exercise. Some effects of treatment may also increase the risk of exercise-related injuries and adverse effects. For example, survivors with severe anemia should delay activity until the anemia is improved, survivors with compromised immune function should avoid gyms and other public places until their white blood cell counts return to safe levels, and survivors undergoing radiation should avoid swimming pools because chlorine exposure may irritate irradiated skin.

Qualifying Statements

Qualifying Statements

- It is important that health care providers, cancer survivors, and caregivers consider the nutritional and physical activity issues discussed in this report within the context of the individual survivor's overall medical and health situation. This report is not intended to imply that nutrition and physical activity are more important than other clinical or self-care approaches. For example, although the guideline authors present dietary suggestions for persons with bowel changes and fatigue, they recognize that other medical interventions may be more effective in controlling those symptoms. Furthermore, just as standard treatment options vary by the type of cancer, nutrition and physical activity factors may impact some cancer types but not others. In writing the recommendations, the authors have assumed that survivors and their caregivers are receiving appropriate medical and supportive care and are seeking high-quality information on self-care strategies to provide further relief of symptoms and to enhance health.
- The decision regarding when to initiate and how to maintain physical activity should be individualized to the patient's condition and personal preferences. For older individuals and those with bone metastases or osteoporosis, or significant impairments such as arthritis or peripheral neuropathy, careful attention should be given to balance and safety to reduce the risk of falls and injuries. The presence of a caregiver or exercise professional during exercise sessions can be helpful.
- Recommendations for nutrition and physical activity in those who are living with advanced cancer are best based on individual nutrition needs and physical abilities.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Patient Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

End of Life Care

Getting Better

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Rock CL, Doyle C, Demark-Wahnefried W, Meyerhardt J, Courneya KS, Schwartz AL, Bandera EV, Hamilton KK, Grant B, McCullough M, Byers T, Gansler T. Nutrition and physical activity guidelines for cancer survivors. *CA Cancer J Clin.* 2012 Jul-Aug;62(4):243-74.
[PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2003 Sep (revised 2012 Jul)

Guideline Developer(s)

American Cancer Society - Disease Specific Society

Source(s) of Funding

American Cancer Society

Guideline Committee

American Cancer Society 2011 Nutrition, Physical Activity, and Cancer Survivorship Advisory Committee

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Financial Disclosures/Conflicts of Interest

The authors report no conflicts of interest.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Doyle C, Kushi LH, Byers T, Courneya KS, Demark-Wahnefried W, Grant B, McTiernan A, Rock CL, Thompson C, Gansler T, Andrews KS, The 2006 Nutrition, Physical Activity and Cancer Survivorship Advisory Committee, American Cancer Society. Nutrition and physical activity during and after cancer treatment: an American Cancer Society guide for informed choices. CA Cancer J Clin 2006 Nov-Dec;56(6):323-53.

Guideline Availability

Electronic copies: Available from the [CA: A Cancer Journal for Clinicians Web site](#) .

Print copies: Available from the American Cancer Society, 250 Williams St., Suite 600, Atlanta, GA 30303; Web site: www.cancer.org

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Availability of Companion Documents

The following is available:

- Kushi LH, Doyle C, McCullough M, Rock CL, Demark-Wahnefried W, Bandera EV, Gapstur S, Patel AV, Andrews K, Gansler T, American Cancer Society 2010 Nutrition and Physical Activity Guidelines Advisory. American Cancer Society guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. CA Cancer J Clin 2012 Jan-Feb;62(1):30-67. Electronic copies: Available from the [CA: A Cancer Journal for Clinicians Web site](#) .

In addition, a continuing medical education activity is available with the [original guideline document](#) .

Patient Resources

A variety of resources for patients and caregivers are available from the [American Cancer Society Web site](#) or by calling 1-800-227-2345.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

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